

REMARKS/ARGUMENTS

Favorable reconsideration of this application, in view of the present amendment and in light of the following discussion, is respectfully requested.

Claims 1-3, 12, 14-16, and 18-25 are pending. In the present amendment, Claims 1-3, 12, 14-16, and 18-20 are currently amended, Claim 4-11, 13, and 17 are canceled without prejudice or disclaimer, and new Claims 21-25 are added. Support for the present amendment can be found in the original specification, for example, at page 19, line 21 through page 20, line 23, at page 25, lines 3-12, at page 25, line 14 to page 29, line 13, at page 29, lines 15-26, in Figures 1-6, and in original Claims 14, 19, and 20. Thus, it is respectfully submitted that no new matter is added.

In the outstanding Office Action, Claims 6-11 were withdrawn; Claim 19 was objected to; Claim 15 was rejected under 35 U.S.C. § 112, second paragraph; Claim 1 was rejected under 35 U.S.C. § 102(e) as anticipated by Barnes et al. (U.S. Publication No. 2004/0077511, hereinafter “Barnes”); Claims 1 and 5 were rejected under 35 U.S.C. § 102(b) as anticipated by Law et al. (U.S. Patent No. 4,960,488, hereinafter “Law”); Claims 1, 4, 5, and 19 were rejected under 35 U.S.C. § 102(b) as anticipated by Shrotriya (U.S. Patent No. 6,068,729); Claims 1, 4, and 5 were rejected under 35 U.S.C. § 102(b) as anticipated by Xia et al. (U.S. Patent No. 6,255,222, hereinafter “Xia”); Claim 3 was rejected under 35 U.S.C. § 103(a) as unpatentable over Law and further in view of Redeker et al. (U.S. Patent No. 5,454,903, hereinafter “Redeker”); Claims 18 and 20 were rejected under 35 U.S.C. § 103(a) as unpatentable over Shrotriya; Claims 12, 13, 14, and 17 were rejected under 35 U.S.C. § 103(a) as unpatentable over Shrotriya in view of Frankel et al. (U.S. Publication No. 2002/0073922, hereinafter “Frankel”); and Claims 2, 15, and 16 were rejected under 35 U.S.C. § 103(a) as unpatentable over Shrotriya in view of Frankel, and further in view of

Nakaune et al. (U.S. Publication No. 2001/0017190, hereinafter “Nakaune”) and Bailey (U.S. Publication No. 2003/0047140).

In the section titled Election/Restrictions on pages 2 and 3 of the Office Action, it is noted that during a telephone conversation with Applicants’ representative on January 16, 2009, a provisional election was made without traverse to prosecute the invention of Group I, corresponding to Claims 1-5 and 12-20. Applicants hereby affirm this election based on the belief that Applicants are not prejudice against filing one or more divisional applications that cover the non-elected claims. Further, it is noted that withdrawn Claims 6 and 7-11 are hereby canceled without prejudice or disclaimer.

In response to the objection to Claim 19, it is noted that none of the amended claims recites the objected to term of “using plasma the nitrogen...” Accordingly, it is respectfully requested that this objection be withdrawn.

In response to the rejection of Claim 15 under 35 U.S.C. § 112, second paragraph, it is noted that Claim 15 is hereby amended to recite “the first plasma and the second plasma.” Accordingly, in view of the above amendment to Claim 15, it is believed that all pending claims are definite and no further rejection on that basis is anticipated. However, if the Examiner disagrees, the Examiner is invited to telephone the undersigned who will be happy to work with the Examiner in a joint effort to draft mutually acceptable language.

Turning now to the rejections under 35 U.S.C. § 102(e), 35 U.S.C. § 102(b), and 35 U.S.C. § 103(a), Applicants respectfully request reconsideration of these rejections and traverse these rejections, as discussed below.

Amended Claim 1 recites:

A process chamber cleaning method in a substrate processing apparatus configured to perform a nitriding process or oxidizing process as a predetermined process on a target substrate accommodated in a process chamber, the method comprising:

performing a cleaning cycle a plurality of times within the process chamber that does not accommodate the target substrate, wherein the cleaning cycle alternately includes generating first plasma of a first mixture gas consisting essentially of oxygen gas and argon gas within the process chamber to clean the process chamber, and generating second plasma of a second mixture gas consisting essentially of nitrogen gas and argon gas within the process chamber to clean the process chamber.

Accordingly, Claim 1 is hereby amended to clarify that an oxygen containing gas is a first mixture gas *consisting essentially of* oxygen gas and argon gas and the nitrogen containing gas is a second mixture gas *consisting essentially of* nitrogen gas and argon gas.¹

Thus, cleaning of the process chamber can be performed by utilizing oxygen radicals and nitrogen radicals without using a corrosive gas, such as fluorine-containing compound. Further, since argon, which has a large atomic weight, is partly turned into plasma, a physical action at a suitable level is applied to the inner surface of the process chamber so that cleaning of the process chamber can be efficiently performed. It is respectfully submitted that the cited references do not disclose or suggest every feature recited in amended Claim 1.

Each of the primary references (Barnes, Law, Shrotriya, and Xia) describe techniques that perform cleaning by use of gases containing oxygen atoms or nitrogen atoms, but each of them is arranged to use a corrosive compound (such as a fluorine-containing compound) as a main part of the cleaning gas in the first or second cleaning.

Accordingly, it is respectfully submitted that none of the primary references disclose or suggest “performing a cleaning cycle a plurality of times within the process chamber that does not accommodate the target substrate, wherein the cleaning cycle alternately includes generating first plasma of a first mixture gas consisting essentially of oxygen gas and argon gas within the process chamber to clean the process chamber, and generating second plasma

¹ See the original specification, for example, at page 19, line 21 to page 20, line 23, at page 25, line 14 to page 29, line 13, and in Figures 1-6.

of a second mixture gas consisting essentially of nitrogen gas and argon gas within the process chamber to clean the process chamber,” as recited in amended Claim 1.

Instead, as discussed above, because each of the references uses a corrosive compound as a main part of the cleaning gas, none of the references teaches using a first mixture gas *consisting essentially of* oxygen gas and argon gas or a second mixture gas *consisting essentially of* nitrogen gas and argon gas. Further, none of the techniques described in the primary references includes utilizing argon gas for cleaning.

Thus, it is respectfully requested that the rejections of Claim 1, and all claims dependent thereon, as anticipated by Barnes, Law, Shrotriya, or Xia be withdrawn.

Regarding the rejection of Claims 3 as unpatentable over Law in view of Redeker, it is noted that Claim 3 is dependent on Claim 1, and thus is believed to be patentable for at least the reasons discussed above with respect to Claim 1. Further, it is respectfully submitted that Redeker does not cure the above-noted deficiencies of Law. Thus, it is respectfully requested that the rejection of Claim 3 be withdrawn.

Regarding the rejection of Claims 18 and 20 as unpatentable over Shrotriya, it is noted that Claims 18 and 20 are dependent on Claim 1, and thus are believed to be patentable for at least the reasons discussed above with respect to Claim 1. Thus, it is respectfully requested that the rejection of Claims 18 and 20 as unpatentable over Shrotriya be withdrawn.

Independent Claim 12 recites:

A substrate processing method for performing a nitriding process or oxidizing process as a predetermined process on a target substrate accommodated in a process chamber, the method comprising:

performing a cleaning cycle a plurality of times within the process chamber that does not accommodate the target substrate, wherein the cleaning cycle alternately includes generating first plasma of a first mixture gas consisting essentially of oxygen gas and argon gas within the process chamber to clean the process chamber, and generating second

plasma of a second mixture gas consisting essentially of nitrogen gas and argon gas within the process chamber to clean the process chamber;

after the performing, seasoning the process chamber that does not accommodate the target substrate by generating plasma of the first mixture gas or generating plasma of the second mixture gas within the process chamber; and

after the seasoning, loading the target substrate into the process chamber and performing the predetermined process on the target substrate.

Accordingly, Claim 12 recites a method that also includes a cleaning cycle in which a first plasma of a first mixture gas consisting essentially of oxygen and argon gas is generated and a second plasma of a second mixture gas consisting essentially of nitrogen gas and argon gas is also generated. Further, after performing the cleaning cycle, the method recited in amended Claim 12 includes seasoning the process chamber that does not accommodate the target substrate by generating plasma of the first mixture gas or generating plasma of the second mixture gas within the process chamber. It is respectfully submitted that the cited references do not disclose or suggest every feature recited in amended Claim 12.

As discussed above with respect to Claim 1, it is respectfully submitted that Shrotriya does not disclose or suggest cleaning utilizing the claimed first mixture gas or the second mixture gas. Further, it is respectfully submitted that Frankel does not cure this deficiency of Shrotriya. Additionally, although the Office Action relies on Frankel as describing using a pre-deposition seasoning process with TEOS and ozone flow to create a pre-deposition layer, it is noted that amended Claim 12 recites that the seasoning includes generating the plasma of the first mixture gas and the second mixture gas. Thus, the TEOS and ozone flow are not the claimed seasoning.

Therefore, it is respectfully submitted that the cited combination of Shrotriya in view of Frankel does not disclose or suggest every feature recited in amended Claim 12. Thus, it is

respectfully requested that the rejection of Claim 12 and all claims dependent thereon, as unpatentable over Shrotriya in view of Frankel be withdrawn.

Regarding the rejections of Claims 2, 15, and 16, it is noted that Claim 2 is dependent on Claim 1 and Claims 15 and 16 are dependent on Claim 12. Accordingly, Claims 2, 15, and 16 are believed to be patentable for at least the reasons discussed above with respect to Claims 1 and 12. Additionally, it is respectfully submitted that Nakaune and Bailey do not share the above-noted deficiencies with respect to Shrotriya in view of Frankel. Thus, it is respectfully requested that the rejection of Claims 2, 15, and 16 be withdrawn.

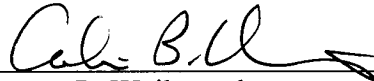
New Claims 21-25 are added by the present amendment. Support for the present amendment can be found in the original specification, for example, at page 25, lines 3-12, at page 29, lines 15-26, and in Claims 14, 19, and 20. Thus, it is respectfully submitted that no new matter is added.

New Claims 21-25 depend on independent Claim 12. Therefore, it is respectfully submitted that new Claims 21-25 patentably define over the cited references for at least the reasons discussed above with respect to Claim 12.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application and the present application is believed to be in condition for formal allowance. A Notice of Allowance is earnestly solicited.

Respectfully submitted,

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A handwritten signature in cursive script, appearing to read "Colin B. Harris", is written over a horizontal line.

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